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APPLICATION ELEMENTS

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SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT I, Toshiro Obitsu, a citizen of Japan residing at Inagi-shi, Tokyo, Japan have invented certain new and useful improvements in

ELECTRONIC APPARATUS, POWER CONTROL APPARATUS AND
METHOD FOR CONTROLLING A SUPPLY OF POWER

of which the following is a specification : -

TITLE OF THE INVENTION

ELECTRONIC APPARATUS, POWER CONTROL
APPARATUS AND METHOD FOR CONTROLLING A SUPPLY OF
POWER

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BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to
electronic apparatuses, power control apparatuses and
10 methods for controlling a supply of power, and more
particularly to an electronic apparatus, a power
control apparatus and a method for controlling a
supply of power in that desired functions can be
realized by using a connector device corresponding to
15 a function device connected to an detachable function
device.

Recently, a laptop personal computer using
a battery is provided. In such a laptop personal
computer, just the most essential functions are
20 provided in its base unit to minimize the base units.
Accordingly, a PC card slot is provided in the base
unit to extend their functions. A desired function
is realized by mounting a PC card, which has a needed
extended function, to the PC card slot.

25 2. Description of the Related Art

A conventional portable or laptop personal
computer will be described by referring to FIG.1.

FIG.1 is a block diagram showing a
construction of the conventional laptop personal
30 computer.

The conventional laptop personal computer
1 includes an information processing system 2, a
battery unit 3, a power source circuit 4, a PC card
slot 5 and a drive bay 6.

35 The information processing system 2
includes a CPU 7, bridge circuits 8 and 9, a graphic
controller VGA 10, an audio controller 11, a PC card

controller 12, a hard disk drive 13 and a floppy disk drive 14.

The CPU 7 processes information in accordance with programs. The bridge circuit 8 is provided between the CPU 7 and each part and controls a connection between the CPU 7 and each part.

The bridge circuit 9 is provided between the drive bay 6 and a bus 22 and controls a connection between the drive bay 6 and the bus 22. The graphic controller VGA 10 controls for displaying processed data.

The audio controller 11 processes audio data. The PC card controller 12 is provided between the PC card slot 5 and the bus 22 and controls a connection between the PC card slot 5 and the bus 22.

The battery unit 3 generates power. Voltage generated by the battery unit 3 is supplied to the power source circuit 4. The power source circuit 4 supplies power to a drive unit mounted to the drive bay 6 and a PC card inserted into the PC card slot 5.

A drive unit, such as a CD-ROM drive unit, a DVD-ROM drive unit, a hard disk drive unit or a magneto-optical disc drive unit, is mounted to the drive bay 6. A PC card, such as a modem card, an IC memory card, a SCSI card or a DVD decoding card, is inserted into the PC card slot 5.

A case of mounting the DVD-ROM drive unit to the drive bay 6 will now be described.

As shown in FIG.1, the DVD-ROM drive unit 15 is mounted to the drive bay 6 in order to read data from a DVD-ROM disk 16. However, the CPU 7 can not process signals read by the DVD-ROM disk unit 15 because the data from the DVD-ROM drive unit 15 is encoded. Accordingly, in a system shown in FIG.1, a DVD decoding card 17 is inserted into the PC card slot 5 to decode the data read by the DVD-ROM disk

unit 15. The signals are converted to data that can be processed by the CPU 7 so as to be displayed.

The DVD decoding card 17 includes a decoder 18 and a processing circuit 19. The decoder 18 decodes data read by the DVD-ROM drive unit 15. The processing circuit 19 controls the data to decode at the decoder 18.

The DVD decoding card 17 is capable of connecting to an exclusive cable 20 for a television. Images and audio are output to a television receiver 21 via the exclusive cable 20.

In the conventional laptop personal computer shown in FIG.1, when the PC card is inserted into the PC card slot 5, the power source circuit 4 always supplies power to the PC card slot 5, regardless of use or not use. For example, when the DVD decoding card 17 is inserted into the PC card slot 5, power is always supplied to the DVD decoding card 17 even if the DVD-ROM drive unit 15 is not connected to the drive bay 6. As a result, the battery unit 3 consumes extra power. In a state in which the DVD decoding card 17 is not used to decode data from the DVD-ROM disk 16, the power supplied to the DVD decoding card 17 is completely wasted.

SUMMARY OF THE INVENTION

It is a general object of the present invention to provide an electronic apparatus, a power control apparatus and a method for controlling a supply of power, in which the above-mentioned problems are eliminated.

A more specific object of the present invention is to provide an electronic apparatus, a power control apparatus and a method for controlling supply of power, which can reduce unwanted power consumption.

The above objects of the present invention

are achieved by an electronic apparatus for realizing a desired function by combining a plurality of units, including: a judging part judging whether a combination of the plurality of units is to realize the desired function; and a power supply control part controlling a supply of power from a power source to at least one of the units of the combination used to realize the desired function based on a judgement result of the judging part.

10 According to the present invention, it is judged whether the combination of the plurality of units is that for realizing the desired function and the supply of power to at least one of the units that are used to realize the desired function is controlled. Therefore, when the combination is not to realize the desired function, at least one unit that is used to realize the desired function is not supplied power. Accordingly, unwanted power consumption can be reduced.

20 On the other hand, other units that are used to realize another function are supplied power. Thus, the another function can be realized.

 The above objects of the present invention are achieved by an electronic apparatus connectable to a plurality of units, including: a judging part judging whether a combination of at least two of the plurality of units is a predetermined combination; and a power source control part stopping a supply of power to at least one unit in the combination when the judging part judges that the combination is the predetermined combination.

 According to the present invention, in accordance with the combination of the two units of the plurality of units is the predetermined combination, it is possible to stop supplying power to at least one unit that is not required. Therefore, unwanted power consumption can be reduced.

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On the other hand, other units that are used to realize another function are supplied power. Thus, the another function can be realized.

Moreover, the above objects of the present invention are achieved by a power control apparatus for an electronic apparatus which realizes a desired function by combining a plurality of units, including: a judging part judging whether a combination of the plurality of units is to realize the desired function; and a power supply control part controlling a supply of power from a power source to the units of the combination used to realize the desired function based on a judgement result of the judging part.

According to the present invention, it is judged whether the combination of the plurality of units is to realize the desired function and the supply of power to some units that are used to realize the desired function is controlled. Therefore, when the combination is not to realize the desired function, the units that are used to realize the desired function are not supplied power so that extra power consumption can be prevented.

On the other hand, other units that are used to realize another function are supplied power. Thus, the another function can be realized.

Furthermore, the above objects of the present invention are achieved by a method for controlling a supply of power in an electronic apparatus that realizes a desired function by combining a plurality of units, including the steps of: (a) judging whether a combination of the plurality of units is to realize the desired function; and (b) controlling the supply of power from a power source to at least one of the units of the combination used to realize the desired function based on a judgement result in step (a).

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According to the present invention, it is judged whether the combination of the plurality of units is to realize the desired function and the supply of power to some units that are used to realize the desired function is controlled. Therefore, when the combination is not to realize the desired function, the units that are used to realize the desired function are not supplied power so that extra power consumption can be prevented.

On the other hand, other units that are used to realize another function are supplied power. Thus, the another function can be realized.

Other objects, features and advantages of the present invention will become more apparent from the following detailed description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG.1 is a block diagram showing a construction of the conventional laptop personal computer;

FIG.2 is a diagram illustrating an electronic apparatus according to a first embodiment of the present invention;

FIG.3 is a block diagram showing a construction of a laptop personal computer according to the first embodiment of the present invention;

FIG.4 is a block diagram illustrating a mechanism of the DVD-ROM drive unit according to the first embodiment of the present invention;

FIG.5A through FIG.5D are diagrams showing identifying circuits for the drive units according to the first embodiment of the present invention;

FIG.6 is a flow chart for explaining a power control according to the first embodiment of the present invention;

FIG.7 is a flow chart for explaining the

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power control according to a second embodiment of the present invention; and

FIG.8 is a flow chart for explaining the power control according to a third embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG.2 is a diagram illustrating an electronic apparatus according to a first embodiment of the present invention.

In the first embodiment, a laptop personal computer as the electronic apparatus will be described.

The laptop personal computer 100 includes a base unit 101 and a display part 102. The base unit 101 includes a keyboard 103 and a pointing device 104. The keyboard 103 includes a plurality of keys to input codes such as characters. The pointing device 104 includes a flat pointing device to move a pointer on a display and operate a desired button.

In addition, the base unit 101 provides an opening 107 to insert a floppy disk 106 to a floppy disk drive 105 and a multi bay 108 to connect to a detachable drive unit at the front of the base unit 101. The floppy disk drive 105 writes information on the floppy disk 106 and reads the information therefrom.

Any one of a CD-ROM drive unit 109, a DVD-ROM drive unit 110, a hard disk drive unit 111 and a magneto-optical disc drive unit 112 is mounted to the multi bay 108.

A CD-ROM disk 113 is inserted into the CD-ROM drive unit 109. The CD-ROM drive unit 109 operates CD-ROM disk 113 to read information recorded thereon.

A DVD-ROM disk 114 is inserted into the DVD-ROM drive unit 110. The DVD-ROM drive unit 110

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reads information recorded on the DVD-ROM disk 114.

A hard disk is accommodated to the hard disk drive unit 111. The hard disk drive unit 111 operates the hard disk to write information on and to read the information from the hard disk.

A magneto-optical disc cartridge 115 which accommodates a magneto-optical disc is inserted into the magneto-optical disc drive unit 112. The magneto-optical disc drive unit 112 writes information to the magneto-optical disc accommodated in the magneto-optical disc cartridge 115 and reads the information recorded on the magneto-optical disc.

Also, a PC card slot 116 is provided at the left side of the base unit 101. A PC card, which is in conformity to the PCMCIA (Personal Computer Memory Card International Association) standard, is inserted into the PC card slot 116. A modem card 117, an IC memory card 118, a SCSI card 119 or a DVD decoding card 120 may be used as the PC card. In the PCMCIA standard, the PC card is 85.6 mm in length, 54 mm in width and 3.3 mm in thickness of a type 1 PC card, 5.0 mm in thickness of a type 2 PC card or 10.5 mm in thickness of a type 3 PC card.

In the modem card 117, an edge of one short side is connected to a terminal 121 of the PC card slot 116 provided inside of the base unit 101 and an edge of another short side is connected to one terminal of a communication cable 122. Also, another terminal of the communication cable 122 is connected to a telephone line. The modem card 117 is used to connect the base unit 101 to the telephone line.

In the IC memory card 118, an edge of one short side is connected to the terminal 121 of the PC card slot 116 provided inside of the base unit 101. The IC memory card 118 is used as an additional memory. Information recorded to the IC memory card 118 can not be erased when the PC card 118 is ejected

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from the base unit 101.

In the SCSI card 119, an edge of one short side is connected to the terminal 121 of the PC card slot 116 provided inside of the base unit 101 and an edge of another short side is connected to one terminal of a SCSI cable 123. Also, another terminal of the SCSI cable 123 is connected to peripheral equipment having a SCSI interface. The SCSI card 119 is used for an interface between the base unit 101 and peripheral equipment having a SCSI interface.

In the DVD decoding card 120, an edge of one short side is connected to the terminal 121 of the PC card slot 116 provided inside of the base unit 101. The DVD decoding card 120 decodes information, which is read from the DVD-ROM disk 114 inserted into the DVD-ROM drive unit 110 connected to the multi bay 108, into information that can be decoded by the CPU 7 in the base unit 101.

Also, in the DVD decoding card 120, an edge of another short side can be connected to a cable 124 connecting a television. The DVD decoding card 120 converts image information, which is read from the DVD-ROM disk 114 loaded into the DVD-ROM drive unit 110 mounted in the multi bay 108, to television signals and outputs converted image information to the cable 124 connecting to the television. One end of the cable 124 is connected to an end of another short side of the DVD decoding card 120. Another end of cable 124 has four pin jacks, namely, a stereo sound output pin jacks 125 and 126, an image output pin jack 127 and a S-image sound output pin jack 128. The stereo sound output pin jacks 125 and 126 of another end of the cable 124 are connected to stereo sound input terminals of a television receiver 129. The image output pin jack 127 is connected to an image input terminal of the television receiver 129. The S-image sound output

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pin jack 128 is connected to a S-image input terminal of the television receiver 129.

5 The display part 102 is pivotable in a B1 or B2 direction about an A axis provided at an end of a backside of the base unit 101. When the display part 102 is pivoted to the B1 direction from an opened position, a display panel 130 faces the base unit 101 covers the keyboard 103 and the pointing device 104 at a closed position. At the closed position, the form of the laptop personal computer 100 is about a flat board.

Also, when the display part 102 is pivoted to the B2 direction from the closed position, the display panel 130 and the keyboard 103 and the pointing device 104 are opened to operate. The display panel 130 of the display part 102 includes a LCD (Liquid Crystal Device) and displays information processed by the base unit 101.

FIG.3 is a block diagram showing a construction of a laptop personal computer according to the first embodiment of the present invention. In FIG.3, parts that are the same as those shown in FIG.2 are given the same reference numbers, and the description thereof is omitted.

25 A battery unit 201, a power source circuit 202, an information processing unit 203 and a power control switch 204 are internally mounted in the base unit 101.

30 The battery unit 201 is a power source to operate the laptop personal computer. The power source circuit 202 supplies voltage generated by the battery unit 201 to the DVD-ROM drive unit 110 inserted in the multi bay 108. The power source circuit 202 also supplies the voltage to the DVD decoding card 120 inserted into the PC card slot 116 through the power control switch 204.

The information processing unit 203

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includes a CPU 211, a chip set 212, a memory 213, a video graphics controller 214, an audio card 215, a PC card controller 216, a bridge circuit 217 and hard disk drive 218.

5 The CPU 211 processes instructions in accordance with programs. The CPU 211 is connected to the chip set 212. Also, the chip set 212 is connected to the video graphics controller 214, the memory 213 and a bus 218. The chip set 212 controls
10 a connection between the CPU 211 and each part.

 The bridge circuit 217 connects the DVD-ROM drive unit 110 connected to the multi bay 108 to the bus 218. The bridge circuit 217 is also connected to the power control switch 204 and controls 'ON' or
15 'OFF' of the power control switch 204.

 The DVD decoding card 120 will now be described.

 The DVD decoding card 120 includes a decoder 301, a processing circuit 302 and an
20 identification storage part 303. The decoder 301 decodes information read from the DVD-ROM drive unit 110. The processing circuit 302 supplies the information read from the DVD-ROM drive unit 110 to the decoder 301 and then outputs data decoded by the
25 decoder 301 to the PC card controller 216. The identification storage part 303 stores a PC card identification and retrieves the PC card identification based on a command from the PC card controller 216. When power is turned ON, the
30 processing unit 203 reads an ID information from the PC card connecting to the PC card slot 116 identifies the PC card to select a driver that is used.

 The DVD-ROM drive unit 110 inserted in the multi bay 108 will be described.

35 FIG.4 is a block diagram illustrating a mechanism of the DVD-ROM drive unit according to the first embodiment of the present invention.

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The DVD-ROM drive unit 110 includes a turntable 401, a spindle motor 402, a laser emission part 403, an optical head 404, a detection part 405, a VCM 406, a signal demodulating part 407, a control circuit 408, an interface 409 and an identifying circuit 410. The DVD-ROM disk 114 in FIG.3 is mounted on the turntable 401. The spindle motor 402 is engaged with the turntable 401 and rotates the turntable 401.

The spindle motor 402 rotates the turntable 401 and then rotate the DVD-ROM disk 114 mounted on the turntable 401 is rotated. The optical head 404 is located to face the DVD-ROM disk 114. A laser beam emitted from the laser emission part 403 focuses on the DVD-ROM disk 114. The laser beam emitted from the optical head 404 to the DVD-ROM disk 114 is reflected and supplied to the detection part 405. The VCM 406 moves the optical head 404 in a radius direction and controls the optical head 404. By the controlled optical head 404, the laser beam follows a track that records data on the DVD-ROM disk 114. Signals detected by the detection part 405 are supplied to the signal demodulating part 407.

The signal demodulating part 407 demodulates detected signals. Signals demodulated by the signal demodulating part 407 are supplied to the DVD decoding card 120 in FIG.3 through the information processing unit 203 in FIG.3 through the interface 409.

The signal demodulated by the signal demodulating part 407 is supplied to the control circuit 408. The control circuit 408 controls the spindle motor 402, the laser emission part 403 and the VCM 406 in accordance with the signals supplied from the signal demodulating part 407. Also, the control circuit 408 is connected to the information processing unit 203 through the interface 409 and

controls each part in accordance with commands from the information processing unit 203.

5 The identifying circuit 410 receives power from the power source circuit 202 and sends a signal for identifying the DVD-ROM drive unit 110 to the information processing unit 203 through the interface 409. The identifying circuit 410 is provided to not only the DVD-ROM drive unit 110 but also other drive units, that is, the CD-ROM drive unit 109, the hard disk drive unit 110 or the magneto-optical disc drive unit 112. In the information processing unit 203, a drive unit connected in the multi bay 108 is identified based on information result of the identifying circuit 410. Accordingly, the information processing unit 203 executes processes corresponding to the drive unit connected in the multi bay 108.

The identifying circuit 410 will now be described.

20 FIG.5A is a diagram showing an identifying circuit for the CD-ROM drive unit 109 according to the first embodiment of the present invention. FIG.5B is a diagram showing an identifying circuit for the DVD-ROM drive unit 110 according to the first embodiment of the present invention. FIG.5C is a diagram showing an identifying circuit for the hard disk drive unit 111 according to the first embodiment of the present invention. FIG.5D is a diagram showing an identifying circuit for the magneto-optical disc drive unit 112 according to the first embodiment of the present invention.

30 When the CD-ROM drive unit 109 is connected to the multi bay 108, the identifying circuit for the CD-ROM drive unit 109 receives power from the power source circuit 202 shown in FIG.5A. The power supplied from the power source circuit 202 is supplied to an identification signal output

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terminal T1 of four identification signal output
terminals T1, T2, T3 and T4 through a resistor R1.
In this case of the CD-ROM drive unit 109, the other
identification signal output terminals T2, T3 and T4
5 are grounded.

Hence, an identification signal formed by
outputs of the four identification signal output
terminal T1, T2, T3 and T4 shows "1000". When the
identification signal "1000" is supplied to the
10 information processing unit 203 from the drive unit
mounted in the multi bay 108, the information
processing unit 203 recognizes that the CD-ROM drive
unit 109 is connected to the multi bay 108. Thus,
the information processing unit 203 executes
15 processes corresponding to the CD-ROM drive unit 109.

When the DVD-ROM drive unit 110 is
connected to the multi bay 108, the identifying
circuit 410 for the DVD-ROM drive unit 110 receives
power from the power source circuit 202 shown in
20 FIG.5B. The power supplied from the power source
circuit 202 is supplied to the identification signal
output terminals T1 and T2 of the four identification
signal output terminals T1, T2, T3 and T4 through
resistors R1 and R2. In this case of the DVD-ROM
25 drive unit 110, the other identification signal
output terminals T3 and T4 are grounded.

Hence, the identification signal formed by
outputs of the four identification signal output
terminals T1, T2, T3 and T4 shows "1100". When the
30 identification signal "1100" is supplied to the
information processing unit 203 from the drive unit
connected in the multi bay 108, the information
processing unit 203 recognizes that the DVD-ROM drive
unit 110 is connected to the multi bay 108. Thus,
35 the information processing unit 203 executes
processes corresponding to the DVD-ROM drive unit 110.

When the hard disk drive unit 111 is

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connected to the multi bay 108, the identifying circuit 410 for the hard disk drive unit 111 receives power from the power source circuit 202 as shown in FIG.5C. The power supplied from the power source circuit 202 is supplied to the identification signal output terminals T1, T2 and T3 of the four identification signal output terminals T1, T2, T3 and T4 through resistors R1, R2 and R3. In this case of the hard disk drive unit 111, the identification signal output terminal T4 is grounded.

Hence, the identification signal formed by outputs of the four identification signal output terminals T1, T2, T3 and T4 shows "1110". When the identification signal "1110" is supplied to the information processing unit 203 from the hard disk drive unit 111 connected in the multi bay 108, the information processing unit 203 recognizes that the hard disk drive unit 111 is connected to the multi bay 108. Thus, the information processing unit 203 executes processes corresponding to the hard disk drive unit 111.

When the magneto-optical disc drive unit 112 is connected to the multi bay 108, the identifying circuit 410 for the magneto-optical disc drive unit 112 receives power from the power source circuit 202 as shown in FIG.5D. The power supplied from the power source circuit 202 is supplied to all four identification signal output terminals T1, T2, T3 and T4 through resistors R1, R2, R3 and R4.

Hence, the identification signal formed by outputs of the four identification signal output terminals T1, T2, T3 and T4 shows "1111". When the identification signal "1111" is supplied to the information processing unit 203 from the drive unit connected in the multi bay 108, the information processing unit 203 recognizes that the magneto-optical disc drive unit 112 is connected to the multi

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bay 108. Thus, the information processing unit 203 executes processes corresponding to the magneto-optical disc drive unit 112.

5 The power control switch 204 will now be described.

FIG.6 is a flow chart for explaining a power control process according to the first embodiment of the present invention.

10 When power of the base unit 101 is turned on (step S1), the CPU 211 turns on the power switch 204 through the bridge circuit 217 and judges which PC card is inserted in the PC card slot 116 (step S2).

15 In the step S2, the CPU 211 sends a request command to request ID information through the PC card controller 216. In accordance with the request command sent from the CPU 211, the PC card, that is, the DVD decoding card 120 shown in FIG.3, retrieves the ID information that is stored in the identification storage part 303 and that indicates
20 the DVD decoding card. Then, the PC card sends the ID information back to the CPU 211 through the PC card controller 216. Thus, the CPU 211 can recognize which PC card is inserted into the PC card slot 116 based on the ID information retrieved from the
25 identification storage part 303 of the PC card.

Subsequently, after the CPU 211 obtains the ID information, the CPU 211 judges whether the PC card loaded into the PC card slot 116 is a DVD decoding card or not in step S3. In step S4, as a
30 result of step S3, when the PC card loaded into the PC card slot 116 is not the DVD decoding card 120, that is, when the PC card is the modem card 117, the IC memory card 118 or the SCSI card 119, the power control switch 204 remains being ON to supply power
35 to the PC card because the PC card may be used.

On the contrary, when the PC card inserted into the PC card slot 116 is the DVD decoding card

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120, the CPU 211 judges which device is inserted into the multi bay 108 in step S5.

As described by referring to FIG.5A through FIG.5D, in the step S5, when the device unit
5 is turned on, the CPU 211 judges based on the identification signal from the identifying circuit 410. When the identification signal shows "1000", the device unit is the CD-ROM drive unit 109. When the identification signal shows "1100", the device
10 unit is the DVD-ROM drive unit 110. When the identification signal shows "1110", the device unit is the hard disk drive unit 111. When the identification signal shows "1111", the device unit is the magneto-optical disc drive unit 112.

15 Moreover, the CPU 211 judges whether the DVD-ROM drive unit 110 is connected to the multi bay 108 or not in step S6.

In step S6, when it is judged that the DVD-ROM drive unit 110 is connected to the multi bay
20 108, the power control switch 204 remains being ON and power is being supplied to the DVD decoding card 120 because it is needed to operate the DVD decoding card 120 inserted into the PC card slot 116 when the DVD-ROM drive unit 110 is operated.

25 On the other hand, in step S6, when it is judged that a drive unit other than the DVD-ROM drive unit 110 is connected to the multi bay 108, the power control switch 204 is turned off a supply of power to the DVD decoding card 120 is stopped in step S7
30 because it is not required to operate the DVD decoding card 120 inserted into the PC card slot 116 while the drive unit connected to the multi bay 108 is operated.

As described above, according to the first
35 embodiment, a type of the PC card inserted into the PC card slot 116 and a type of the drive unit connected to the multi bay 108 are judged and the

power control switch 204 is controlled to be ON or OFF. Therefore, even if the DVD decoding card 120 is inserted into the PC card slot 116, the power is not supplied to the DVD decoding card 120 while the DVD-ROM drive unit 110 is not connected to the multi bay 108. Accordingly, it is possible to prevent from supplying extra power. Thus, unwanted power consumption can be reduced.

In this embodiment, the supply of power to the DVD decoding card 120 is controlled, but the present invention is not limited to this case. The power control according to the present invention can be applied to any case in which the process is performed by the PC card inserted into the PC card slot 116 and the drive unit connected to the multi bay 108. Also, the supply of power to a drive unit may be controlled when a drive unit always requires a PC card in a process.

In the first embodiment, the supply of power is controlled when the base unit 101 is turned on. But alternatively, the supply of power may be controlled when a drive unit is connected again to the multi bay or when the PC card is inserted again into the PC card slot.

A power control, in a case in which a supply of power to the PC card is controlled when the drive unit is connected again to the multi bay or when the PC card is connected again to the PC card slot, will now be described.

A construction of the power control in a second embodiment is the same as that of the power control in the first embodiment and the description thereof will be omitted. However, the power control process in the second embodiment is different from that in the first embodiment.

FIG.7 is a flow chart for explaining the power control according to the second embodiment of

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the present invention. In FIG.7, those steps that are the same as the steps of Fig. 6 are designated by the same reference numerals, and the description thereof is omitted.

5 In the second embodiment, step S11 is processed instead of step S1 shown in FIG.6.

 In step S11, it is judged whether a drive unit 110 is connected to the multi bay 108 or whether a PC card is inserted into the PC card slot 116. The
10 step S2 is processed when the drive unit 110 is connected or when the PC card is inserted.

 In the first and the second embodiments, the supply of power to the PC card is stopped in the case of the combination of the DVD decoding card and
15 another drive unit. But alternatively, the supply of power may be stopped in accordance with a combination of more than two of a plurality of cards and a plurality of drive units.

 A power control in a case of combinations
20 of more than two of a plurality of cards and a plurality of drive units will now be described.

 A construction of the power control in a third embodiment is the same as that of the power control in the first embodiment and the description
25 thereof will be omitted.

 FIG.8 is a flow chart for explaining the power control according to the third embodiment of the present invention.

 The power control in the third embodiment
30 includes step S21 of identifying types of PC cards inserted into the PC card slot 116, step S22 of identifying types of drive units connected to the multi bay 108, step S23 of judging whether or not a combination of types of PC cards identified in step
35 S21 and types of drive units identified in step S22 is in a table and step S24 for stopping the supply of power to the PC cards.

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the present invention is not limited to the PC cards but may apply to the drive units.

5 The present invention is not limited to the specifically disclosed embodiments, variations and modifications, and other variations and modifications may be made without departing from the scope of the present invention.

10 The present application is based on Japanese Priority Application No. 11-131373 filed May 12, 1999, the entire contents of which are hereby incorporated by reference.

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WHAT IS CLAIMED IS:

5

1. An electronic apparatus for realizing a desired function by combining a plurality of units, comprising:

10 a judging part judging whether a combination of the plurality of units is to realize said desired function; and

15 a power supply control part controlling a supply of power from a power source to at least one of said units of said combination used to realize said desired function based on a judgement result of the judging part.

20

2. The electronic apparatus as claimed in claim 1, wherein said judging part comprises:

25 an identification information obtaining part obtaining identification information for identifying from said plurality of units; and

30 an information judging part judging whether said desired function is realized based on the identification information obtained from said plurality of units.

30

35 3. The electronic apparatus as claimed in claim 1, wherein said plurality of units are detachable.

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4. The electronic apparatus as claimed in
5 claim 1, wherein said plurality of units includes at
least one device unit reading information and at
least one PC card decoding the information read by
the device unit,

10 said judging part identifying a type of
said device unit and a type of said PC card,

15 said power supply control part stopping
the supply of power to the PC card when said judging
part judges that said device unit does not use said
PC card.

20 5. The electronic apparatus as claimed in
claim 4, wherein said power supply control part
supplies the power to said PC card when said judging
part judges that said PC card is not used with a
desired device unit, or when said judging part judges
25 that said PC card is used with the desired device
unit and the desired device unit is connected to said
electronic apparatus, and

30 said power supply control part stops the
supply of power to said PC card when said PC card is
used with the desired device unit but the desired
device unit is not connected to said electronic
apparatus.

35

6. The electronic apparatus as claimed in
claim 1, wherein said power source is a battery unit.

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5 7. An electronic apparatus connectable to
a plurality of units, comprising:

 a judging part judging whether a
combination of at least two of said plurality of
units is a predetermined combination; and
10 a power source control part stopping a
supply of power to at least one unit in the
combination when said judging part judges that the
combination is the predetermined combination.

15

 8. The electronic apparatus as claimed in
claim 7, wherein said judging part comprises a table
20 storing predetermined combinations of two of said
plurality of units, and said judging part judges
whether the combination is one of the predetermined
combinations based on the table.

25

 9. The electronic apparatus as claimed in
claim 7, wherein said judging part judges whether or
30 not a combination of said plurality of units is the
predetermined combination when the electronic
apparatus is turned on or when said plurality of
units are connected to the electronic apparatus.

35

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10. A power control apparatus for an electronic apparatus which realizes a desired function by combining a plurality of units, comprising:

5 a judging part judging whether a combination of said plurality of units is to realize said desired function; and

 a power supply control part controlling a supply of power from a power source to said units of
10 said combination used to realize said desired function based on a judgement result of said judging part.

15

11. A power control apparatus for an electronic apparatus connectable to a plurality of units, comprising:

20 a judging part judging whether or not a combination of at least two of said plurality of units is the predetermined combination ; and

 a power control part stopping a supply of power to at least one unit of the predetermined
25 combination when it is judged that the combination is the predetermined combination.

30

12. The power control apparatus as claimed in claim 11, wherein said judging part comprises a table storing predetermined combinations of at least two of said plurality of units, and said
35 judging part judges whether the combination of at least two of said plurality of units is one of the predetermined combinations based on the table.

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5 13. The power control apparatus as
claimed in claim 11, wherein said judging part judges
whether or not said combination of at least two of
said plurality of units is the predetermined
10 combination when said electronic apparatus is turned
on or when connected to said plurality of units.

15 14. A method for controlling a supply of
power in an electronic apparatus that realizes a
desired function by combining a plurality of units,
comprising the steps of:

20 (a) judging whether a combination of the
plurality of units is to realize said desired
function; and

25 (b) controlling a supply of power from a
power source to at least one of said units of said
combination used to realize said desired function
based on a judgement result in step (a).

30 15. The method as claimed in claim 14,
wherein said step (a) comprises the steps of:
obtaining identification information for
identifying from said plurality of units; and
judging whether said desired function is
35 realized based on the identification information
obtained from said plurality of units.

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16. The method as claimed in claim 14,
5 wherein said plurality of units includes at lease one
device unit reading information and at least one PC
card decoding the information read by the device unit,
said step (a) identifies a type of said
device unit and a type of said PC card, and
10 said step (b) stops the supply of power to
the PC card when said judging part judges that said
device unit does not use said PC card.

15

17. The method as claimed in claim 14,
wherein said step (b) supplies the power to said PC
20 card when said step (a) judges that said PC card is
not used with a desired device unit, or when said
step (a) judges that said PC card is used with the
desired device unit and the desired device unit is
connected to said electronic apparatus, and
25 said step (b) stops the supply of power to
said PC card when said PC card is used with the
desired device unit but the desired device unit is
not connected to said electronic apparatus.

30

18. A method for controlling a supply of
power in an electronic apparatus connectable to a
35 plurality of units, comprising the steps of:

(a) judging whether a combination of at
least two units of said plurality of units is a

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predetermined combination; and

(b) stopping a supply of power to at least one unit in the combination when said judging part judges that the combination is the predetermined

5 combination.

10 19. The method as claimed in claim 18,
wherein said step (a) judges whether or not said
combination of at least two units is the
predetermined combination when said electronic
apparatus is turned on or when said two units are
15 connected to said electronic apparatus.

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ABSTRACT OF THE DISCLOSURE

In an electronic apparatus for realizing a desired function by combining a plurality of units, a judging part judges whether a combination of the
5 plurality of units is to realize the desired function and a power supply control part controls a supply of power from a power source to at least one of the units of the combination used to realize the desired
10 function based on a judgement result of the judging part.

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UTILITY MODEL ABSTRACTS OF JAPAN

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Int. Cl. G06F 1/32, G06F 1/26, G06F 3/147

Application number: 0385913

Date of filing: 25.09.91

Applicant: MITSUTOYO:KK

Inventor: MAMORU YASUDA, NOBUAKI MASAMUNE, KENNGI MATSUMOTO

Title: POWER SUPPLY CONTROL CIRCUIT OF PORTABLE INFORMATION PROCESSING APPARATUS

Abstract:

PURPOSE: To provide the power control circuit of a portable information processing apparatus which reduces the power consumption with a simple operation while the portable information processing apparatus is operated.

CONSTITUTION: The portable information processing apparatus 1 is activated by a battery and includes a connection terminal 27 connecting to a CRT display and a CRT controller/display circuit 23 operating the CRT display. In addition, a CPU 11 provided in the portable information processing apparatus 1 activates a CRTV signal to supply to a power supply circuit 26 when it is determined by a CRTON signal that a CRT display 3 is connected the connection terminal 27. In response to the CRTV signal, the power supply circuit 26 supplies a power voltage VCRT to the CRT controller/display circuit 23.

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Japanese Utility Model Application Laid-Open No. 5-30930

[Abstract]

[Object] A power saving circuit for a portable information processing apparatus is provided for sufficiently saving electric power even during the operation of the apparatus without requiring complicated manipulations.

[Configuration] A portable information processing apparatus 1, which is driven by a battery, comprises a connection terminal 27 for connecting a CRT display, and a CRT controller/display circuit 23 for driving the CRT display. A CPU 11 contained in the portable information processing apparatus 1 activates a CRTV signal to a power supply circuit 26 only when it detects through a CRTON signal that the CRT display 3 is connected to the connection terminal 27. The power supply circuit 26 supplies the CRT controller/display circuit 23 with a supply voltage VCRT in response to the activated CRTV signal.

[Claim]

[Claim 1] A power saving circuit for a portable information processing apparatus driven by a battery, and having a connection terminal for connecting an external device and a peripheral circuit for driving or accessing the external device, characterized by comprising:

device connection detecting means for detecting that the external device is connected to the connection terminal; and

power supply means for supplying the peripheral circuit with a supply voltage only when the device connection detecting means detects that the external device is connected.

FIG.2

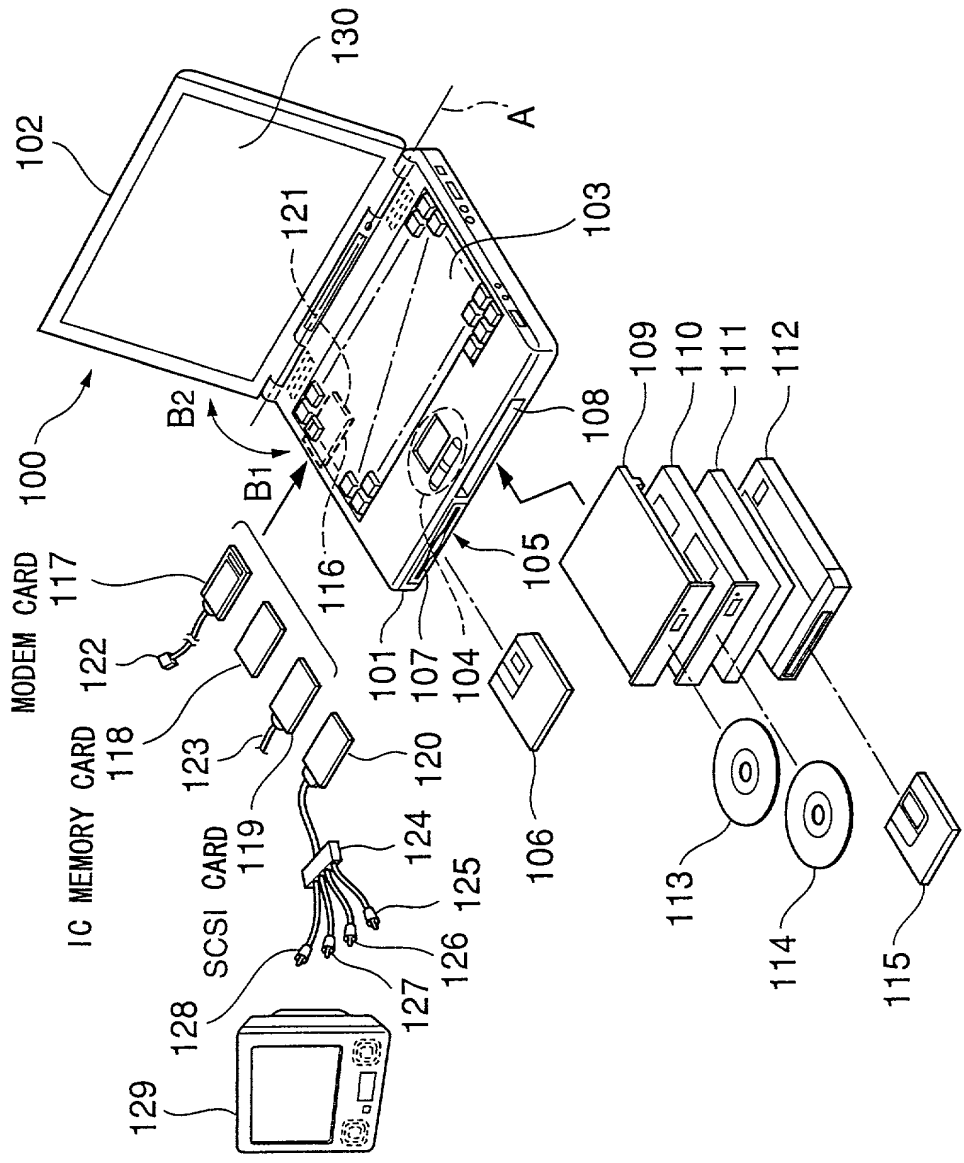


FIG. 3

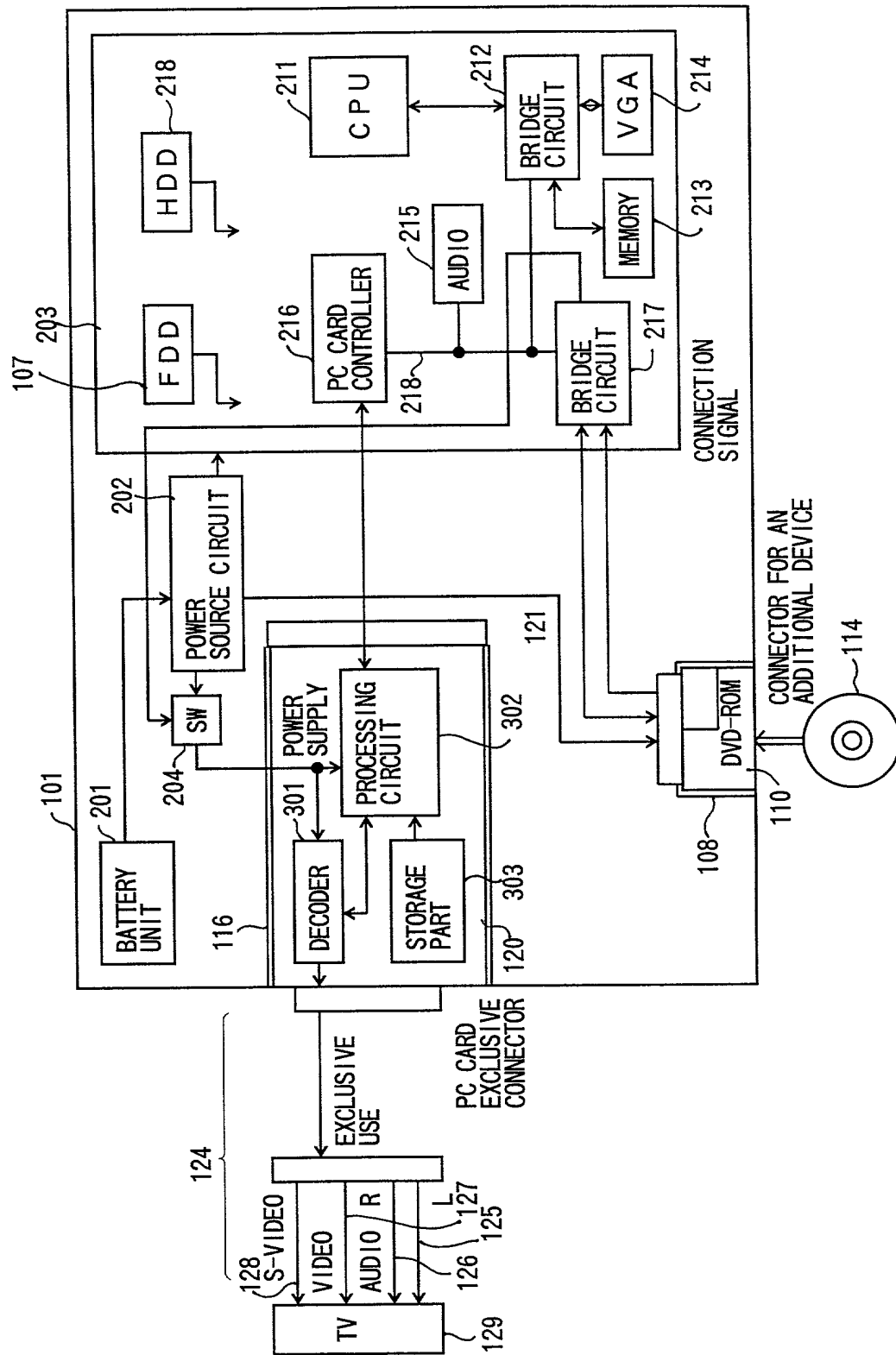
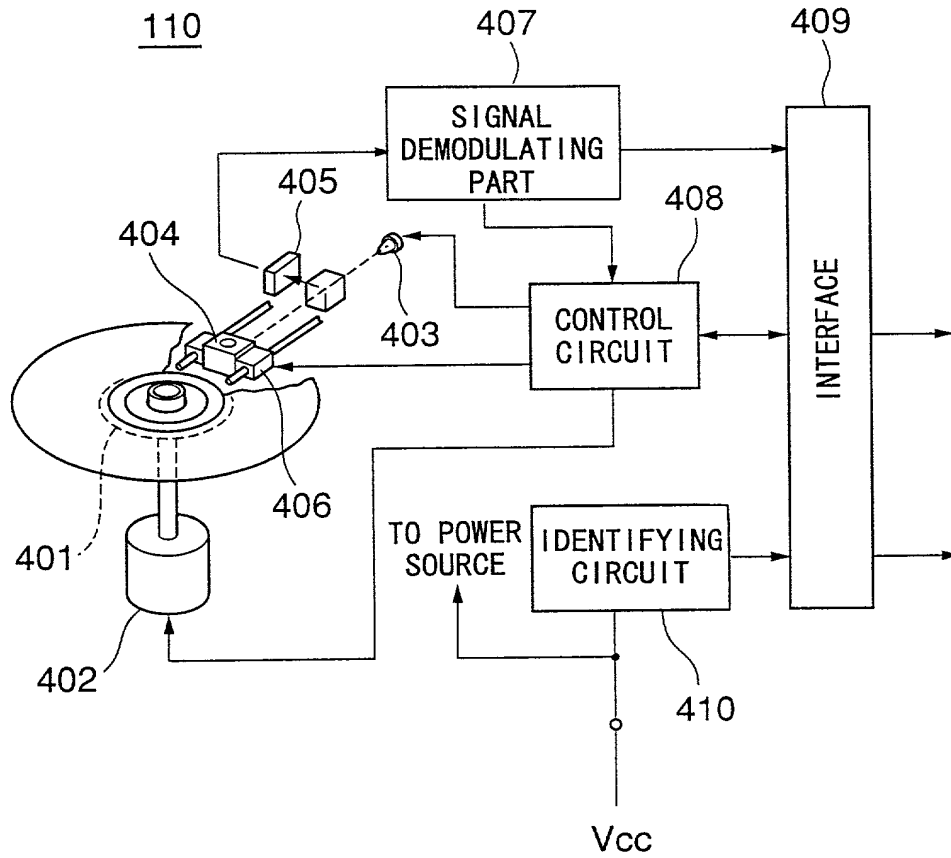


FIG.4



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FIG. 5A

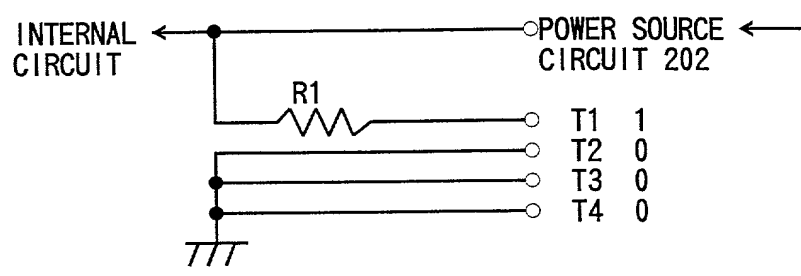


FIG. 5B

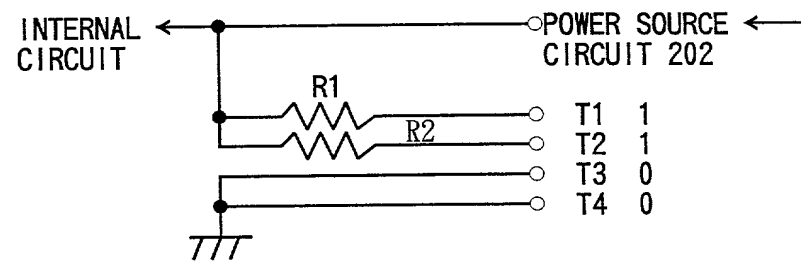


FIG. 5C

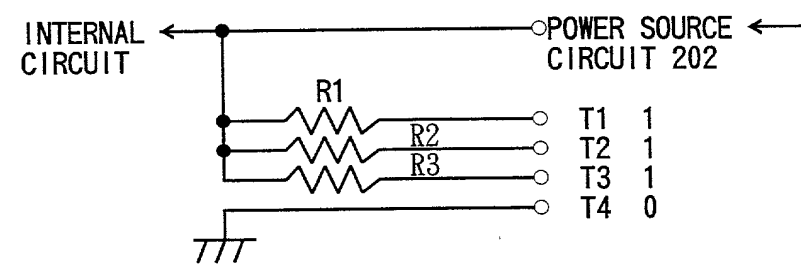


FIG. 5D

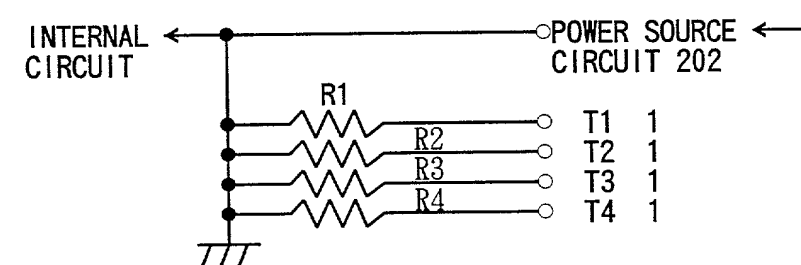


FIG. 6

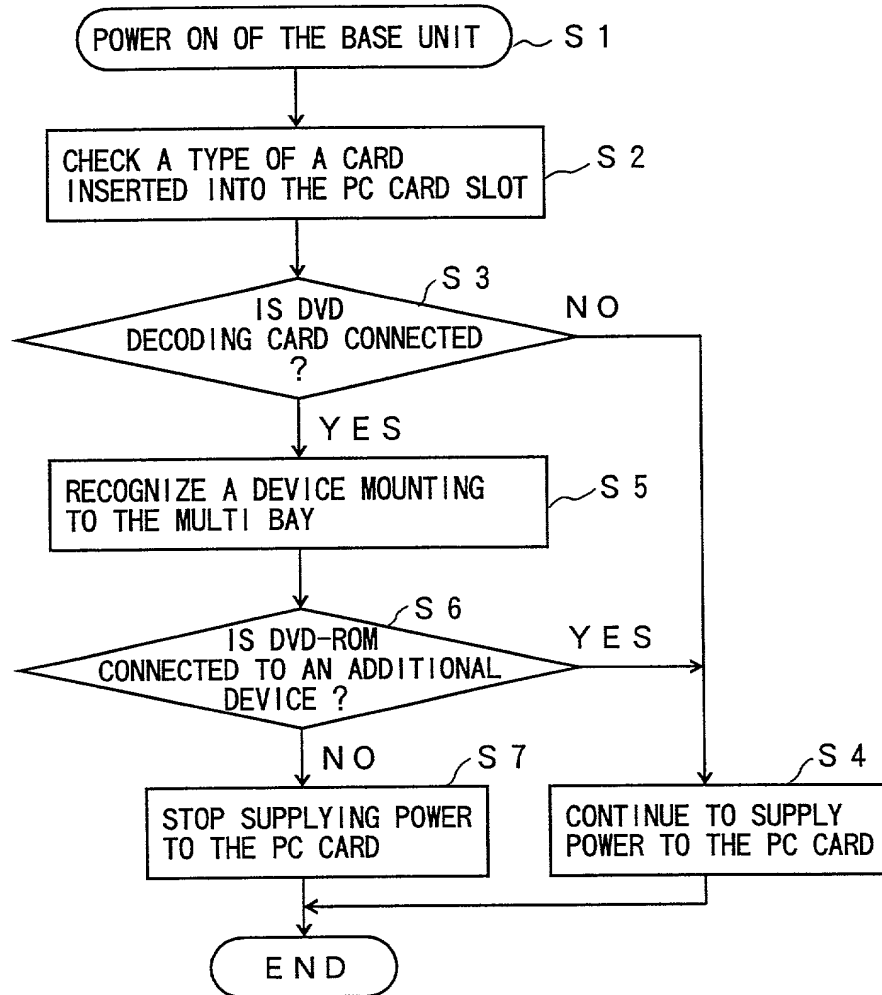
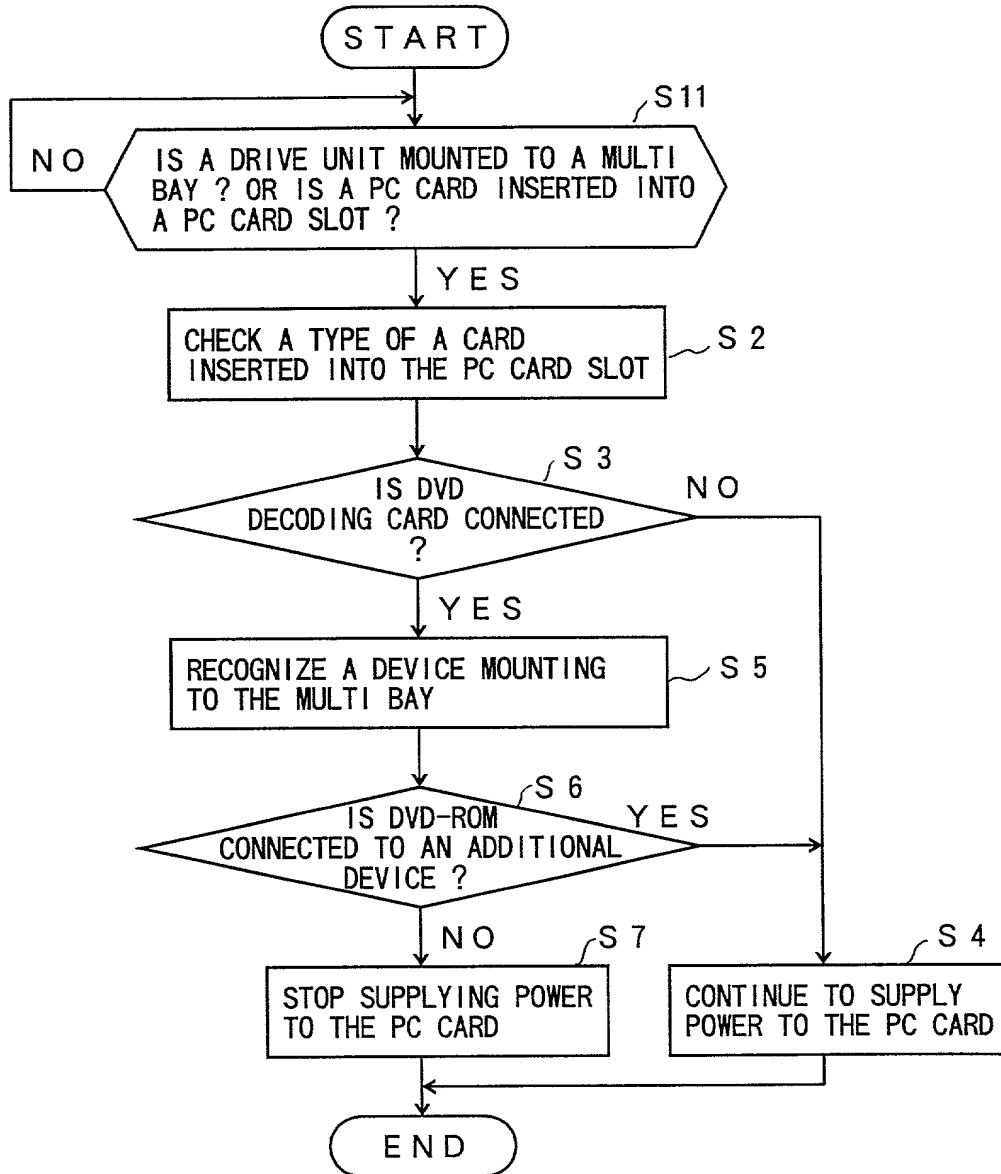
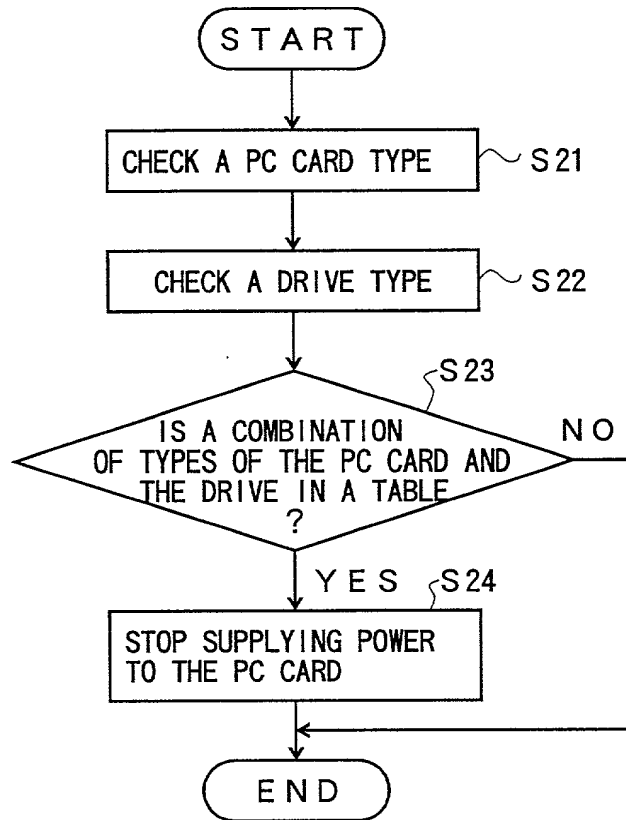


FIG. 7



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FIG. 8



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Declaration and Power of Attorney For Patent Application

特許出願宣言書及び委任状

Japanese Language Declaration

日本語宣言書

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As a below named inventor, I hereby declare that:

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My residence, post office address and citizenship are as stated next to my name.

下記の名称の発明に関して請求範囲に記載され、特許出願している発明内容について、私が最初かつ唯一の発明者（下記の氏名が一つの場合）もしくは最初かつ共同発明者であると（下記の名称が複数の場合）信じています。

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

ELECTRONIC APPARATUS, POWER CONTROL
APPARATUS AND METHOD FOR CONTROLLING
A SUPPLY OF POWER

上記発明の明細書（下記の欄でx印がついていない場合は、本書に添付）は、

the specification of which is attached hereto unless the following box is checked:

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（該当する場合） _____ に訂正されました。

☐ was filed on _____
as United States Application Number or
PCT International Application Number
_____ and was amended on
_____ (if applicable).

私は、特許請求範囲を含む上記訂正後の明細書を検討し、内容を理解していることをここに表明します。

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Prior Foreign Application(s)

外国での先行出願 Patent Applications

No.11-131373

Japan

(Number)

(Country)

(番号)

(国名)

No.2000-77015

Japan

(Number)

(Country)

(番号)

(国名)

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(Application No.)

(出願番号)

(Filing Date)

(出願日)

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(Application No.)

(出願番号)

(Filing Date)

(出願日)

(Application No.)

(出願番号)

(Filing Date)

(出願日)

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I hereby claim foreign priority under Title 35, United States Code, Section 119 (a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Priority Not Claimed

優先権主張なし

12/May/1999

(Day/Month/Year Filed)

(出願年月日)

17/March/2000

(Day/Month/Year Filed)

(出願年月日)

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below.

(Application No.)

(出願番号)

(Filing Date)

(出願日)

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(Status: Patented, Pending, Abandoned)

(現況: 特許許可済、保属中、放棄済)

(Status: Patented, Pending, Abandoned)

(現況: 特許許可済、保属中、放棄済)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith (list name and registration number)

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第二共同発明者	日付	Second inventor's signature	Date
住所	Residence		
国籍	Citizenship		
私書箱	Post Office Address		

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(Supply similar information and signature for third and subsequent joint inventors.)